

## BEHAVIOR OF HORNED GUANS IN CHIAPAS, MEXICO

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ABSTRACT.—Behavior of Horned Guans (*Oreophasis derbianus*) in the El Triunfo Biosphere Reserve, Chiapas, Mexico, from February to May in 1982 and 1983, including preening, dustbathing and foraging behavior during the breeding season, is described. Horned Guans devote most of their daytime activity to preening and comfort behavior. To dustbathe, they use treefall gaps and only bathe once a day. Dustbathing seems to be an important factor during courtship. Horned Guans are mainly arboreal and consume mostly fruits and green leaves. Received 13 April 1993, accepted 1 Sept. 1993.

Most populations of the Horned Guan (*Oreophasis derbianus*) are imperiled as a result of intense hunting and rapid destruction of the cloud forest in the species' restricted geographical range in southern Mexico and Guatemala (Collar et al. 1992). Behavioral and ecological information about the Horned Guan, however, is scanty. A few studies deal with the taxonomy and distribution of this species (e.g., Ridgway and Friedmann 1946, Friedmann et al. 1950, Andrle 1967, Vaurie 1968, Blake 1977, Binford 1989). There are published observations about the species in the field and in captivity (Sclater and Salvin 1859, Salvin 1860, Salvin and Godman 1902, Wagner 1953, Andrle 1967, 1969a, b, Delacour and Amadon 1973, Alvarez del Toro 1976, Parker et al. 1976, Delacour 1977, Estudillo 1979). However, there is little field information concerning its behavior and natural history (see Andrle 1967; González-García 1984, 1988). Here I provide detailed observations on preening, dustbathing, foraging, and other behaviors of Horned Guans in the Sierra Madre de Chiapas during the breeding season.

### STUDY SITE AND METHODS

I made all observations in core area "I" of the El Triunfo Biosphere Reserve, Chiapas, Mexico (Cerro El Triunfo, 15°35'–15°45'N, 92°41'–92°53'W). This core area covers 11,594 ha; elevation varies from 1000 to 2500 m above sea level. Cloud forest occurs within a range of elevations from 1600 to 2450 m, and the study site itself is at 1850 m. González-García (1984), Long and Heath (1991), Williams (1991), and Ramírez and González-García (unpubl. data) provide information on vegetation and climate there. The vegetation is extremely humid and relatively undisturbed cloud forest, with the average annual precipitation exceeding 4000 mm. The mean annual temperature is 18°C, with little annual variation (González-García, unpubl. data).

Field work was conducted during the dry part of the year (February–May) in 1982 and 1983. During eight months of field work, I made daily observations lasting from 30 min to

10 h, depending on ease of observation and weather. I used 10 × 40 binoculars, with or without a blind, at distances ranging from 5 to 35 m. Observations detailed here are based on ten individual Guans recognized on the basis of plumage, location, and horn size.

#### RESULTS AND DISCUSSION

*Preening.*—Observations were made at trees where Horned Guans were feeding or resting and at dust bath sites. Preening occurred throughout the day but especially at midday. Long sessions of preening ( $N = 16$ ) lasted an average of  $1.57 \pm 0.48$  h (SD). Preening is done by both male and female while they are on thick branches. Wings, breast, back, rump, and tail feathers can be cleaned and arranged while the bird is either standing or sitting on the branch, but scratching the face and preening the belly and tarsus feathers can be performed only while standing (the latter, by arching the back slightly and simultaneously lowering the tail to enable the beak to reach the parts that require preening). After preening, the bird shakes itself while standing, often flapping or fully spreading its wings and stretching its neck up and forward.

The Horned Guan generally devotes most of its time to the care and cleaning of its plumage. For example, during 8 hours of observation, a male devoted 6 h to preening and comfort behavior and 2 h to feeding. Horned Guans spend more time attending the back and wing feathers than those of any other part of its body. The order of importance of different body parts with respect to preening and comfort behavior is back and sides (for each,  $N = 13$ ), wings ( $N = 9$ ), spreading wings ( $N = 7$ ), breast ( $N = 3$ ), belly ( $N = 3$ ), and tail ( $N = 3$ ). Only a small proportion of preening involves scratching the head. Sometimes, after a preening session, a guan will expose its plumage to the sun, possibly for the purpose of removing ectoparasites or to dry itself.

Wing feathers are preened from above and below by spreading the wings slightly and running the beak along each feather from base to tip. The tail is preened in the same way. To preen its tail, back, and rump, the bird lowers its wings slightly and raises its tail.

Another observed comfort behavior is the backward spreading of one the of the wings and simultaneously stretching of the leg on the same side of the body. This behavior was observed after resting, preening, bathing, and after a long time spent incubating eggs.

*Dust bathing.*—The dust bath is characteristic of many galliform birds, including the Cracidae. The dust bath is believed to remove parasites, to keep feathers in good condition, and to maintain the optimum amount of oil in the plumage (Campbell and Lack 1985). In the Horned Guan, it may have the additional function of strengthening the pair bond during

courtship; the male often calls its females to the dustbath during courtship, and the nest site is later chosen in a nearby spot.

I found a dust bath site near the Palo Gordo trail (1.5 km west of the El Triunfo station) by following a pair of Horned Guans for 14 days. To bathe, birds use treefall gaps where the sun reaches the forest floor and dries the soil. The dust bath was relatively small at first, but increased in size with continuous use. The birds used the nearby vegetation, including medium-sized trees, bushes, and the branches and roots of the fallen tree that created the gap, as perches before and after bathing. Subsequent field observations indicate that the site used as a bath in 1982 and 1983 was not used in the following years. This suggests that the search for and establishment of new bathing sites may be an important factor during courtship.

Horned Guans usually bathe once, and occasionally two times, a day. Bathing is usually done between 12:00 and 16:00 h (once 10:00 h;  $N = 13$ ), possibly owing to the fact that this is the time when the sun can penetrate the tree canopy most easily, and therefore dry the soil and make it most useful to the birds.

The Horned Guan may bathe alone or with its mate. In the former case, the bird glides silently to branches near the bath, descends to the ground and then walks to the site. On arriving, the bird first scratches the surface of the soil with its feet, making small turns, and then settles on the soil. It supports itself on one side and tosses up soil with the foot and wing on the other side. On finishing, the bird shakes itself three to four times in the bath or on a nearby branch where it then preens. After preening, the bird stretches out its wings until they are at right angles to its sides and sunbathes. From its perch the bird may go down to the ground to eat green leaves or small stones and to sun itself in the aforementioned position.

When bathing with a mate, the male always arrives first, tramples the site with his feet, and then "moos" to attract the female to the site. When the female arrives, the male withdraws briefly and the female begins to bathe, using the technique described above. Meanwhile, the male, standing to one side of the bath, arranges his plumage. When the female finishes and leaves in order to arrange her plumage and eat green leaves and small stones, the male enters the dust bath, bathes and then perches on a branch and begins preening. After both birds have bathed, the female is fed with green leaves by the male and emits calls that sound like guurk, guurk, guurk. On five occasions, a female that was close to a male at the dust bath, was observed to approach the male who had a piece of green leaf in its beak, even though he was not calling.

Single individuals bathe for several minutes ( $\bar{x} = 29.6 \pm 1.1$  min,  $N$

TABLE 1  
LIST OF FAMILIES AND SPECIES OF PLANTS CONSUMED BY THE HORNED GUÁN

| Families <sup>a</sup> | Species   | Plant type                         | Fruit morphology             |
|-----------------------|---|------------------------------------|------------------------------|
| Aquifoliaceae         | <i>Ilex toluicana</i>                           | Lower midstory tree                | Drupe                        |
| Araceae               | <i>Anthurium</i> sp.                            | Epiphytic                          | — <sup>c</sup>               |
| Araliaceae            | <i>Dendropanax populifolius</i>                 | Higher upperstory tree             | Drupe                        |
|                       | <i>D. pallidus</i>                              | Lower upperstory tree              | Drupe                        |
| Cactaceae             | <i>Oreopanax capitatus</i>                      | Epiphytic and higher midstory tree | Drupe                        |
|                       | <i>Epiphyllum crenatum</i> var. <i>crenatum</i> | Epiphytic                          | Berry                        |
| Cloranthaceae         | <i>Hedyosmium mexicanum</i>                     | Higher midstory tree               | Aggregate drupe <sup>b</sup> |
|                       | <i>Eupatorium chiapense</i>                     | Lower understory (herbaceous)      | — <sup>c</sup>               |
| Compositae            | <i>Schistocarpha bicolor</i>                    | Higher understory (herbaceous)     | — <sup>c</sup>               |
|                       | <i>Nectandra reticulata</i>                     | Higher upperstory tree             | Drupe                        |
| Lauraceae             | <i>Ocotea chiapensis</i>                        | Higher midstory tree               | Drupe                        |
|                       | <i>O. matudai</i>                               | Higher midstory tree               | Drupe                        |
|                       | <i>O. uxpanapana</i>                            | Higher midstory tree               | Drupe                        |
|                       | <i>Licaria alata</i>                            | Higher midstory tree               | Drupe                        |
|                       | <i>Persea liebmantii</i>                        | Higher midstory tree               | Drupe                        |
|                       | <i>Persea</i> sp.                               | Lower upperstory tree              | Drupe                        |
|                       | <i>Phoebe bourgeauviana</i>                     | Lower upperstory tree              | Drupe                        |
|                       | <i>P. sillepecana</i>                           | Lower midstory tree                | Drupe                        |
|                       | <i>Smitax jalapensis</i>                        | Lower upperstory tree              | Drupe                        |
|                       | <i>S. lanceolata</i>                            | Lower upperstory tree              | Drupe                        |
| Liliaceae             | <i>S. mollis</i>                                | Hemipiphytic vine                  | Berry                        |
|                       | <i>S. purpusii</i>                              | Hemipiphytic vine                  | Berry                        |
|                       | <i>S. subpubescens</i>                          | Hemipiphytic vine                  | Berry                        |
|                       | <i>Conostegia volcanalis</i>                    | Hemipiphytic vine                  | Berry                        |
|                       | <i>Miconia globulifera</i>                      | Lower midstory tree                | Berry                        |
| Melastomataceae       | <i>Morus insignis</i>                           | Lower midstory tree                | Berry                        |
| Moraceae              |   | Lower upperstory tree              | Aggregate drupe <sup>b</sup> |

TABLE 1  
CONTINUED

| Families <sup>a</sup> | Species   | Plant type   | Fruit morphology                 |
|-----------------------|---|--|----------------------------------|
| Myrsinaceae           | <i>Ardisia cucullata</i><br><i>A. compressa</i><br><i>Cobaea scandens</i> | Lower midstory tree<br>Lower midstory tree<br>Hemiepiphytic vine | Drupe<br>Drupe<br>— <sup>c</sup> |
| Polemoniaceae         | <i>Rhamnus capraefolia</i> var. <i>grandifolia</i>                        | Higher midstory tree   | Drupe                            |
| Rhamnaceae            | <i>Cestrum</i> aff. <i>guatemalense</i>                                   | Lower midstory shrub   | Berry <sup>c</sup>               |
| Solanaceae            | <i>Solanum</i> sp.<br><i>Symplocos hartwegii</i>                          | Hemiepiphytic vine<br>Lower midstory tree                        | Berry <sup>c</sup><br>Drupe      |
| Symplocaceae          | <i>Trema micrantha</i>  | Higher midstory tree   | Drupe                            |
| Ulmaceae              | <i>Urera alceifolia</i>   | Lower midstory tree  | Aqueno                           |
| Urticaceae            | <i>U. caracasana</i>  | Lower midstory tree  | Aqueno                           |
| Verbenaceae           | <i>Citharexylum mocimii</i>   | Higher midstory tree   | Drupe                            |

<sup>a</sup> Listed alphabetically, not systematically.<sup>b</sup> The bird takes bites from the aggregate fruit, each bite containing many fruitlets.<sup>c</sup> Leaves of these species are consumed.

= 5), and members of a pair each spend an average of  $17.5 \pm 2.6$  min bathing (N = 10).

*Frugivory and foraging behaviors.*—I marked all trees, shrubs and herbs used by Horned Guans and collected samples of leaves and fruits of plants consumed. All plants were identified by Ismael Calzada and Fernando Ramírez from the Instituto de Ecología herbarium. I also collected seven droppings from dustbathing sites.

I have observed Horned Guans consuming the fruits of 37 plant species from 18 families and the green leaves of five species (Table 1, including field data up to 1991), but I have never observed Horned Guans eating small vertebrates and only very rarely invertebrates, which other cracids are reported to do (see Sick 1970, Delacour and Amadon 1973, Estudillo 1979, Sermeño 1986). One fecal sample contained three undigested white larvae, which I suspect were consumed in a parasitized fruit. Food is mostly fruits from lower and higher midstory trees, followed by fruits and leaves of epi- and hemiepiphytes at these same levels. Drupes (21 species) and berries (10) are favored (Table 1). With the exception of *Hedyosmum mexicanum* and *Morus insignes*, fruits which were consumed in consecutive bites, other fruits were swallowed whole. Most of these species are commonly found along streams and ravines and on gently sloping hills. The four most common fruits consumed in 1982 and 1983 were *Nectandra reticulata* (N = 35), *Conostegia volcanalis* (N = 22), *Citharexylum mocinnii* (N = 18), and *Morus insignes* (N = 17). The seven fecal samples contained only fruit remains and seeds. Seeds in the fecal samples appeared intact, suggesting that Horned Guans may be important seed disseminators in the cloud forest.

Horned Guans acquired fruit either by reaching or gleaning (sensu Remsen and Robinson 1990), although the former tactic was more common (87.3%, N = 62). Birds arrived at fruiting trees and walked or jumped among branches in search of fruit. Horned Guans fed preferentially from the center of trees, stretching their legs and neck to reach fruit located in the periphery.

Feeding periods lasted 15–20 min ( $\bar{x} = 15.7 \pm 4.9$  min, N = 35). After feeding, guans spent 30–60 min ( $\bar{x} = 47 \pm 10$  min, N = 35) resting or preening on the fruiting tree. I observed that the same individual would visit the same tree several times during the day. For example, a single *Symplocarpo flavifolium* tree was visited ten times by one male and five times by one female in a single day.

Among cracids, Horned Guans seem typical in their consumption of both fruit and green leaves (Salvin 1860, Salvin and Godman 1902, Wagner 1953, Andrlé 1967, Alvarez del Toro 1980). They seem exceptional, however, in that nestlings and fledglings also consume fruit and young



leaves but almost no animal food. Nestlings ( $N = 4$ ) are fed only fruit and green leaves (González-García, unpubl. data).

*Miscellaneous behavior.*—I observed Horned Guans sleeping on eight occasions. Three of these observations were done while the birds were perched in feeding trees and five while they were on the nest. Birds rested with their eyes closed and their bills either on their retracted necks or buried within their back feathers. Additionally, yawning ( $N = 4$ ) was seen at the nest. Each bird stretched its neck and opened its beak wide, similar to a yawn.

Wagner (1953), Leopold (1977), and Estudillo (1979) suggest that Horned Guans are probably among the most terrestrial of the cracids. Contrary to this, I almost always observed Guans in trees of tall or medium height. They descended to the ground only to bathe, court or to ascend slopes. While courting, Guans spent only a few minutes on the ground between flights to trees (González-García, unpubl. data). My observations also conflict with those of Salvin (1860), Wagner (1953), and Alvarez del Toro (1976) who suggested that Horned Guans forage by scratching in leaf litter. I observed Horned Guans foraging or walking on the ground ( $N = 10$ ) but not scratching in leaf litter. Although I never observed Horned Guans drinking from streams, it is possible that they descend to the ground to do so. However, I observed Horned Guans drinking water accumulated in bromeliads on four occasions.

Horned Guans are poor fliers, as are many cracids. To ascend mountain slopes they use short flights with labored flapping, resembling the flapping flight of the Black Vulture (*Coragyps atratus*) (contra Bubb, in Collar et al. 1992:142). To descend into ravines, they move onto high branches and propel themselves with wings, tail and neck extended. They appear to be extremely agile while gliding through vegetation or when walking or climbing among branches.

Further studies of the Horned Guan would be especially valuable in understanding their ecology and basic biology.

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